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## PATENT SPECIFICATION



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## COMPLETE SPECIFICATION.

## Method of Treating Artificial-silk Fibres.

We, OBERREHINISCHE HANDELSGESELLSCHAFT M.B.H., of Karlsruhe i.B., Germany, a German company, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention has reference to a method of increasing the spinning qualities of artificial silk and in particular of staple fibres of artificial silk which have a structure satisfactory for spinning purposes by improving the adhering and intertwining capacity of the individual filaments of the fibres. Staple fibre of artificial silk and the like can only be spun with difficulty, because the fibres are so smooth that they slide off from each other instead of being engaged or so to speak hooked to each other. This drawback causes various difficulties in the process of manufacture, particularly lack of uniformity in the thickness and durability of the slubbing and yarns produced therefrom. Thus, a sufficient degree of durability can only be imparted to such kinds of yarn, for instance, by a comparatively high degree of twisting thereof.

Now, it has been ascertained by our experiments that a certain degree of roughness may be imparted to such fibres and the adhering and retaining qualities of their surface and consequently their adaptability for the spinning process may be greatly increased by causing such substances which are adapted to produce a roughening of the surface to act and to adhere to the surface of the fibres by means of a mechanical, chemical or generally physical nature. As instances

of such substances we may mention oxides or salts of the metals of the alkaline earths or of other metals or powdery, amorphous and earthy substances of various kinds and of inorganic and organic nature, such as talc, cement and the like. Such substances which may be precipitated from a solution, as for instance oxide of alumina, carbonate of lime, lime salt or the like, may be caused to adhere to the surface of the fibres or in the interior thereof by precipitating them on the fibres, and this precipitation may be produced with solutions as well as with gases or vapours.

According to the present invention, smooth fibres which have a structure satisfactory for spinning purposes such as fibres of artificial silk and the like are treated with substantially granular, crystalline, or amorphous roughening agents before being submitted to the spinning or carding operations, the said roughening agents being caused to remain in contact with and to adhere to the fibres.

One may for instance proceed by first impregnating the fibre with a suitable reagent or otherwise incorporating the reagent therewith and by then introducing the fibre thus prepared into a liquid or the like containing the second reagent. By this means the precipitation of the roughening substance may take place directly upon the fibre and to some extent even in the interior thereof, and a particularly high degree of adhesion will be produced thereby. It is, of course, also admissible to employ those reagents which are adhering to the fibre under treatment from its production or as a result of the spinning and sizing thereof.

Other suitable substances, however,

[Price 1/-]

which do not admit of precipitation may, for instance, be mixed with water and with the fibres and then dried thereon. In this manner it is, for instance, possible

5 to obtain a very good adhesion into the fibres of calcium sulphate, cement, caustic lime and the like.

Other substances, however, do not sufficiently adhere to the fibre when dried; 10 such substances may, however, be caused to adhere very strongly to the fibres by the medium of an addition of lubricating or fattening agents or other agglutinants or adhesive agents, such as for instance, 15 soap, oleine, dextrine or the like. Ordinarily, it will be sufficient to merely stir up such substances with water, a fattening agent or lubricant, soap solution or the like and to add this mixture the same 20 as an ordinary lubricant or fattening agent to the fibrous material and then to cause the treated material to pass through a carding or devil machine or any other suitable fibre opening and combining 25 device.

It is also possible within the scope of our invention to utilise all those processes which are ordinarily employed in the mordanting of fibres or fabrics in the dyeing 30 operations and the like, thus, for instance, the impregnation of the fibres with neutral salts, basic salts and the like with subsequent drying and slow heating, by which means, as is well 35 known, metal oxides or the like are precipitated upon the fibres.

Our invention further contemplates the treatment of the fibres with organic colloids such as starch solutions, gelatine and the like by which means a similar 40 effect is produced. The fibres are, for instance, treated with a suspension of such substances and then slowly dried at moderate temperature. It may be 45 advisable sometimes to convert the colloids into the soluble state, thus, for instance, by hardening them or changing them from the sol-condition to the gel-condition. The method may also be 50 carried out in a manner similar to the impregnation of tissues for the purpose of rendering them water-proof, that is to say, the material may, for instance, be treated by impregnation with solutions of 55 metal oxides-salts and by allowing these solutions to vaporise, or by producing precipitates by chemical reaction or the like, thus, for instance, by immersing the fabric in sulphate of alumina, alum or 60 the like and then producing an insoluble precipitate thereof by the reaction with animal or other glue or by the decomposition of easily decomposable salts, such as acetate of alumina at moderate heat or as 65 a further instance by the production of

insoluble soaps which are obtained by the impregnation of the material or of the fabrics with solutions of the metals of the alkaline earths or of metal salts and reacting thereupon with soap solutions. Also 70 other methods which are usually employed in impregnating processes have been found suitable. Generally speaking, all those methods and processes are 75 applicable which will produce a roughened surface by the obtaining of precipitates of organic or inorganic nature or by any other action and which sometimes have the additional effect of curling and folding the fibres. 80

It is advantageous sometimes to combine the different operations of roughening and of precipitating or depositing roughening agents on the fibres with a mechanical treatment thereof in the dry, 85 wet or semi-wet condition, such as stirring, agitation, centrifuging, pounding, pressing, fulling or the like which treatment may succeed the previous roughening treatment. By the superficial roughening 90 the fibres have acquired an increased tendency and adaptability to become curled, twisted and folded by the mechanical treatment, and by this means their spinning 95 qualities are still further improved. As is well known, staple fibre as ordinarily employed is generally provided with curls and the like. But even such 100 previously curled or crisped staple fibre is still difficultly adapted to the spinning process, and it is considerably improved by being treated according to the method of this invention. For this purpose the 105 fibre may first be superficially roughened and then be curled again by mechanical treatment.

The staple fibre treated as hereinbefore described possesses a dull shine and a certain degree of curling. It 110 resembles wool far more than untreated fibre, it is more valuable for spinning purposes and may be spun down much more easily and to a finer thread than untreated staple fibre, particularly, for 115 instance, for worsted and carded goods and the like. In view of the fact that the roughening of the surface of the fibres assists the adhesion, there is no further necessity of imparting such a strong 120 twist to the yarns as in the case of yarns from untreated fibres. The yarns are moreover more fluffy, softer and more resisting to tearing strain than otherwise.

A very high degree of uniformity in the roughening action and in the depositing 125 of roughening agents upon and within the filaments of the fibres will be produced by treating the fibrous material with solutions of crystallisable substances, particularly such which on being 130

evaporated will crystallise well and readily. By this means a very uniformly distributed coating of fine crystals is obtained upon the fibres. In the preferred manner of execution of this part of our invention we may use salt solutions of low concentration.

The treatment of the fibres may either be effected by impregnating them with a solution of crystallisable substances or by immersing the fibrous material in such solutions or by applying the solutions to the fibres in form of drops or in finely atomised condition. The drying may be assisted by the use of heat or of the vacuum, and the adhesion of the crystals to the fibres may be assisted and increased by an addition of lubricants or fattening agents or other adhesives or agglutinants, such as soap, oleine, dextrine and the like.

These and other modifications which may suggest themselves to the expert in accordance with varying conditions of use may be employed in accordance with the principles of this invention, without deviating from the scope and spirit thereof as defined in the appended claims.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. The herein described method of treating normally smooth fibres which have a structure satisfactory for spinning purposes such as fibres of artificial silk and the like and increasing the spinning qualities thereof, which method consists in treating the fibrous material with substantially granular, crystalline or amorphous roughening agents before submitting them to the spinning or carding operations, the said roughening agents being caused to remain in contact with and to adhere to the fibres.

2. A modification of the method as set forth in the preceding claim and particularly distinguished by employing an agglutinant, adhesive or the like for the purpose of facilitating the adhesion of the roughening agents to the fibres.

3. The method of treatment substantially as set forth in Claim 2, and further characterised by the use of soap, oleine, dextrine or the like as agglutinants.

4. A modification of the method as set forth in any of the preceding claims and particularly distinguished by submitting the fibres to a curling, crisping or similar treatment, either before or after the roughening treatment.

5. The method of treatment as set forth particularly in Claims 1 and 4 in which

the fibres are submitted to the curling treatment, both before and after treating and mixing them with the roughening agents.

6. A modification of the method set forth in any of the preceding claims and particularly distinguished by submitting the fibres, besides to a roughening treatment, to an additional, substantially pounding, pressing, fulling or centrifuging treatment.

7. The method of treating smooth fibres with roughening agents as set forth in the preceding claims, which consists in precipitating such agents upon and in contact with the fibres by the decomposition of salts and other reagents, by the solidification or deflocculation of colloids and by similar means.

8. A form of execution of the method as set forth particularly in Claims 1 and 7 and further characterised by precipitating a substantially insoluble deposit of roughening agents on the fibre by the mutual reaction of soluble alumina salts and the like with glue, soaps and the like.

9. A form of execution of the method of treating smooth fibres as set forth in the preceding claims and consisting in suspending substantially insoluble roughening agents, such as lime, cement, sulphate of lime and the like in a liquid such as water and then treating the fibres with the suspension thus produced and drying the fibres with the deposited agent.

10. A modification of the method substantially as set forth in Claims 1, and 5 to 8 and further characterised by impregnating the fibres with a solution of a salt, and then causing the salt to crystallise from the solution upon and in contact with the fibres.

11. A modification of the method as hereinbefore set forth and further characterised by impregnating the fibres with a salt and liberating metal oxides from said salt while in contact with the fibre.

12. As a new article of manufacture, ordinarily smooth textile fibres, such as artificial silk and the like and containing substantially granular roughening agents adhering thereto.

13. A modification of the product as defined in Claim 12 and further characterised by the curled condition thereof.

14. A modification of the product as set forth in Claim 12 and further characterised by an agglutinant such as oleine, dextrine, soap or the like in contact with the fibres and as a means of more completely uniting the roughening agents thereto.

15. The product as set forth in Claims 130

12 to 14 and particularly distinguished by the crystalline condition of the roughening agents in contact with the fibres.

16. A modification of the product as set forth in Claims 12 to 15 and further characterised by the fact that the roughening agents are obtained from colloids

and are in a substantially insoluble condition.

17. The method and product, substantially as hereinbefore described and claimed.

Dated this 19th day of January, 1926.  
MARKS & CLERK.